MARICOPA COUNTY DEPARTMENT OF PUBLIC HEALTH

Quarterly Epidemiologic Report

October – December 2007

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Disease of the Quarter: Meningococcal Meningitis

Overview of Invasive Meningococcal Disease (IMD)

FIGURE 1
A photograph of **the** purple rash often seen in mid-stage meningococcal disease.

Neisseria meningitidis or meningococcus is a gram negative diplococcus. At least 13 serogroups are known. The most common of these, which cause the majority of clinical disease, are A, B, C, Y, and W-135.[1,2] Humans are the only hosts of *N.meningitidis*.[3] Transmission occurs via contact with large aerosol droplets or with respiratory tract secretions, such as those expelled during a cough or sneeze. Examples of contact include kissing, sharing drinks or cigarettes, mouth-to-mouth resuscitation, and intubation.[2]

A carrier state occurs in 10% or more of the population.[4] This may increase to 60-80% in closed populations.[2] Carriers are most frequently colonized in the nasopharynx with low or non-pathogenic strains of *N. meningitidis* or a related non-pathogenic bacteria, *N. lactamica*.[1,4] By age 30, the majority of the population has had 10 different episodes of carriage.[4] Carriage is an immune-inducing event. Cross-reactivity of antibodies occurs.[6] This state is highest in adolescents and lowest in young children.[4] By adulthood, the majority of people have formed antibodies to A, B, C, Y, and W-135.[5] Despite this relatively high carrier state, less than 1% of colonized organisms invade.[7]

Clinical syndromes caused by *N. meningitidis* include septicemia, meningitis, bacteremia, pneumonia, and other infections of normally sterile body fluids, such as septic arthritis, conjunctivitis, and pericarditis.[1] In septicemia, patients often present with hypotension, diffuse petechiae, and may develop disseminated intravascular coagulation and purpura fulminans. In meningitis, the organism crosses the blood-brain barrier. This occurs in 50% of all reported cases and occurs 24-48 hours after the bacteria invades the bloodstream.[8,7] Cases of bacteremia often present with non-

specific symptoms and meningococcus may not be suspected.[9] Pneumonia occurs in up to 15% of the cases.[7] The incubation period of the organism is generally 2-4 days but ranges from 1-10 days. A patient remains infectious as long as *N. meningitidis* remains in the nasopharynx and until 24 hours after receiving appropriate antibiotics.[10]

High risk groups include:

- College freshmen living in dormitories
- Military recruits
- Microbiologists routinely exposed to *N. meningitidis*
- Those with terminal complement component deficiencies
- Those with functional/anatomic asplenia
- Travelers to hyperendemic or epidemic areas. Examples include Sub-Saharan Africa, "the meningitis belt," and Saudi Arabia during the pilgrimage to Mecca.[11,6]

Risk factors for disease include antecedent viral infection, crowding, chronic disease (including hepatic disease), multiple myeloma, systemic lupus erythematous, and both active and passive smoking. Black race and lower socioeconomic status are felt to be risk markers for IMD.[10,6]

Epidemiology in the United States

Nationally

Approximately 1,400-2,800 cases per year occur in the U.S. The rate of disease is 0.5-1.1 per 100,000 population.[11] This range reflects the cyclical incidence of the disease.[12] Ninety-eight percent of cases are sporadic, and outbreaks are uncommon.[5] The Case Fatality Rate (CFR) is high, 10-14%, and may be as high as 20% in the adolescent population.[11,13] Morbidity in survivors occurs in 11-19% and includes limb loss, neurologic disability, and hearing loss.[11] IMD follows a seasonal pattern with the majority of cases in the winter and early spring months.[14]

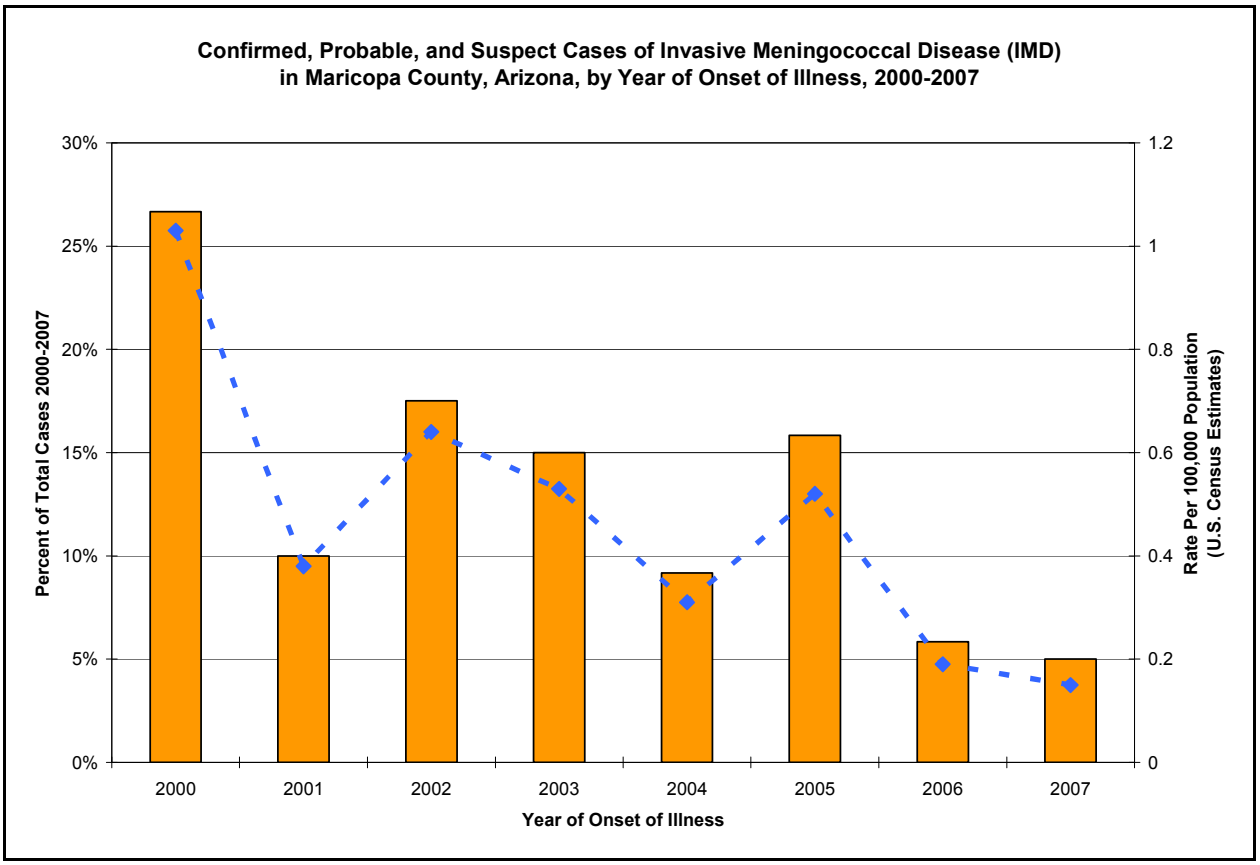
Although the greatest *rate* of disease is in the less-than-1 year old population, the greatest *burden* of disease (percent of cases) is in the 25-64 year old population.[13]

Maricopa County

Between 2000 and 2007, an average of 15 cases per year occurred in Maricopa County. The rate of disease is 0.47 per 100,000 population (range is 0.15-1.03).[17] FIGURE 2 (below), shows a decreasing level of prevalence and rate of disease over the last eight years. It is not clear whether this is a result of a rapidly increasing population, dramatic successes in disease prevention, or both. The average CFR in all age groups is 9.8%, matching the lower range of the national average.[17] The highest CRF in a single age group is the less-than-1 year olds and 18-24 year olds, both at 2.5%.[17]

The burden of disease is nearly equal in the 0-4 year old (31% of cases, n=38) and 25-64 year old (25% of cases, n=30) populations.[17]

FIGURE 2



The seasonal pattern of disease in Maricopa County is shown in FIGURE 3 (below). Cases are at their lowest numbers in late fall, but increase rapidly and continually throughout the winter months. The prevalence of IMD peaks in January-March and drops suddenly, by nearly 75%, in April.

FIGURE 3

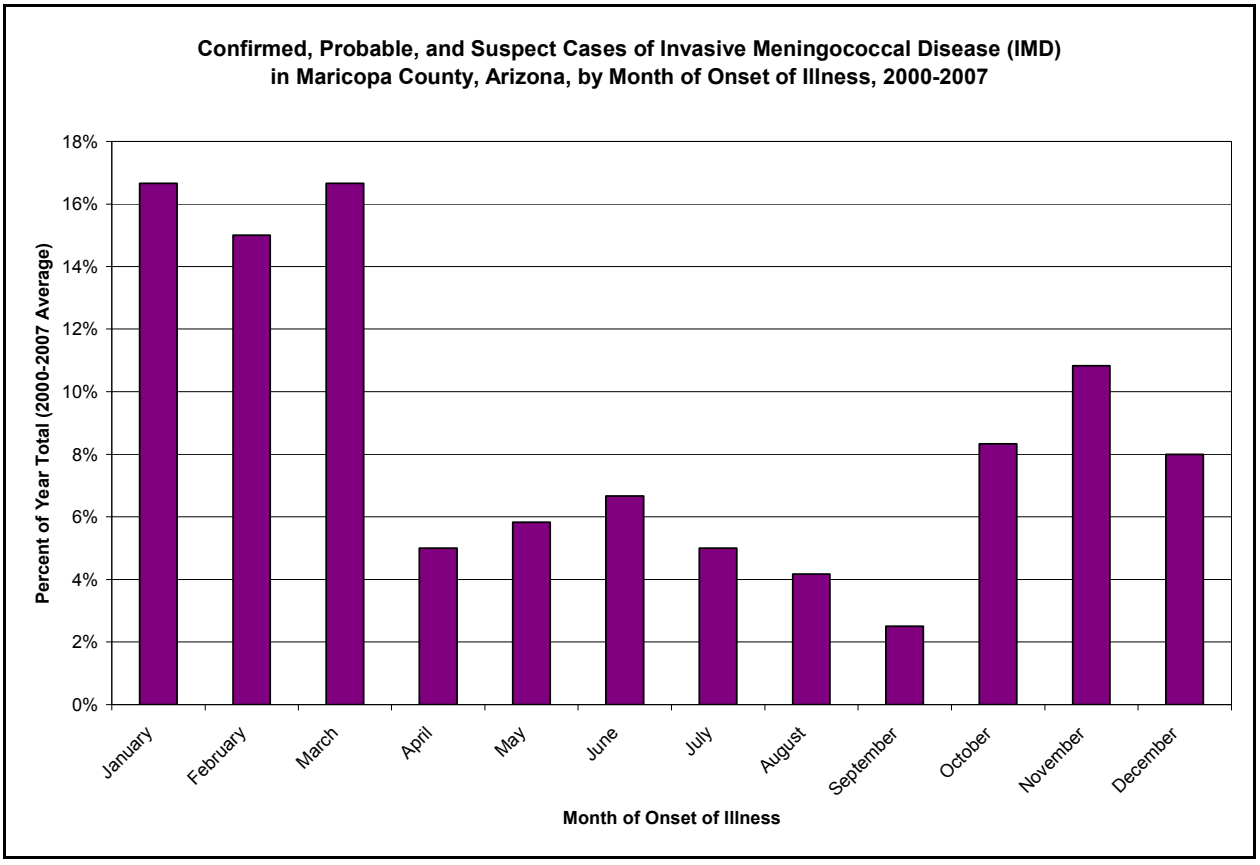
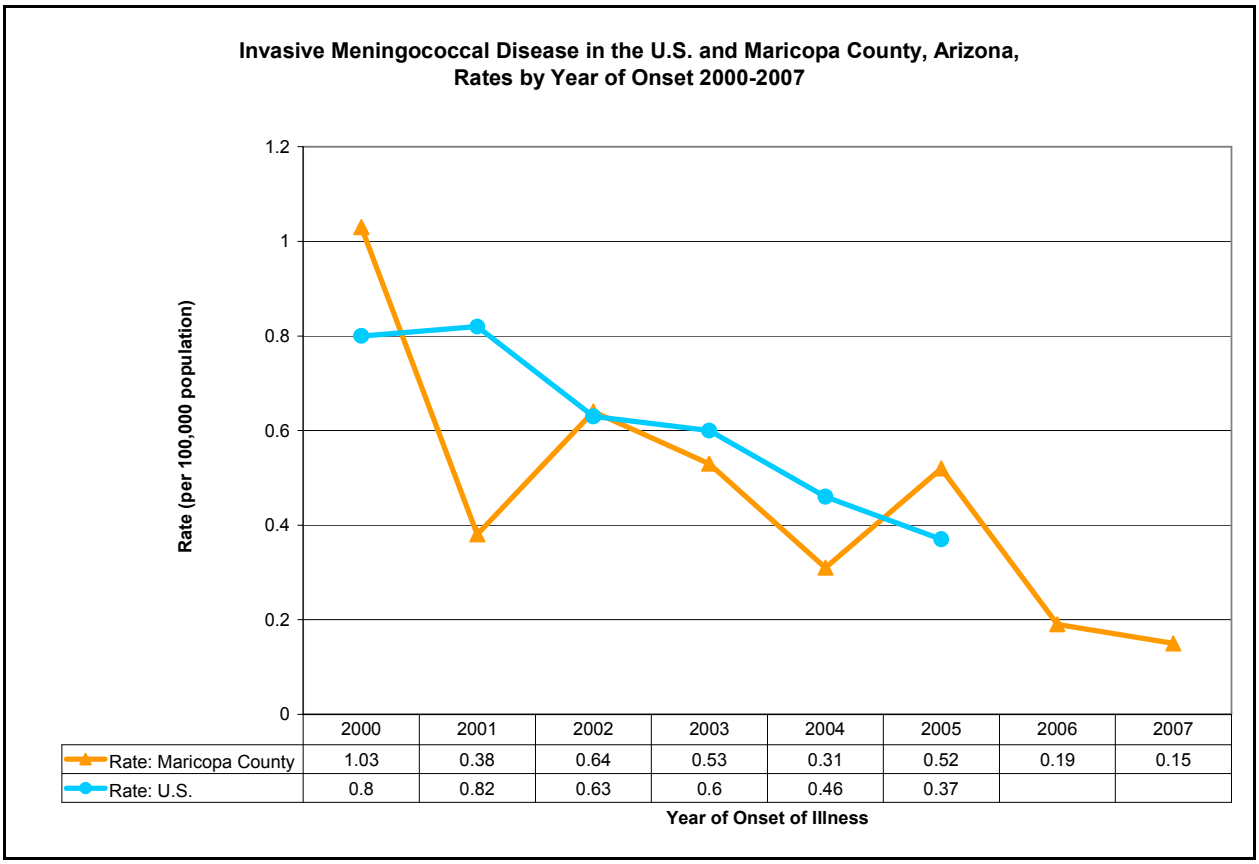


FIGURE 3 (below) compares the rates of IMD in the U.S. to Maricopa County from 2000-2007. The rate in Maricopa County from 2000-2005 was similar to the U.S. rate during this same time period. In both cases, the rate slowly trended down over time and was <1 per 100,000 population.

FIGURE 4



	2000	2001	2002	2003	2004	2005	2006	2007
Rate: Maricopa County	1.03	0.38	0.64	0.53	0.31	0.52	0.19	0.15
Rate: U.S.	0.8	0.82	0.63	0.6	0.46	0.37		

All MC data from MCDPH Office of Epidemiology. Rates per 100,000 population US Census estimates. Raw numbers for US rate calculation obtained from CDC. Summary of Notifiable Diseases, US, 2000-2004. *MMWR* 2000;49(53); *MMWR* 2001;50(53); *MMWR* 2002;51(53); *MMWR* 2003;52(54); *MMWR*2004;53(53)2004 & CDC. Notifiable Diseases/Deaths in Selected Cities Weekly Information. *MMWR* 2006;54(52);1320-1330.

Surveillance in Maricopa County

Reporting is required in Arizona under the Arizona Administrative Code. Reporting requirements differ by reporting group. For *health care providers*, a report must be submitted to the local health department within 24 hours for a case or suspect case. For *laboratories*, a report on a positive lab test must be submitted within 24 hours to the Arizona Department of Health Services and isolates must be submitted to the Arizona State Public Health Laboratory. Violation of this reporting is a Class III Misdemeanor.[16]

Prevention

Vaccination

Currently there are two meningococcal vaccines available in the US, the meningococcal polysaccharide vaccine (MPSV4 or Menomune) and the meningococcal conjugate vaccine (MCV4 or Menactra). Both of these vaccines are tetravalent and contain antigens to serogroups A,C,Y, and W-135. There is no serogroup B coverage in these vaccines.[5]

In the US, the Advisory Committee on Immunization Practices of the CDC has recommended routine vaccination with the meningococcal conjugate vaccine for 11-12 year olds at their pre-adolescent physician visit; catch-up at age 15 if vaccine not yet received; and for those in high risks groups, which includes entering college students who plan to live in dormitories.[11] Groups that have endorsed these recommendations include the American Academy of Pediatrics and the American Academy of Family Physicians.[13,15]

Chemoprophylaxis

Chemoprophylaxis is an important component of prevention. Contacts of IMD cases who should receive prophylaxis include household contacts, child-care center contacts, and those who have had prolonged and/or intimate contact with the patient.[11] Generally, school and work contacts are not included unless the contact has been close. Administration of chemoprophylaxis is ideal within 24 hours of exposure. Benefit is still achieved up to two weeks, however, the benefit decreases as time elapses after exposure. After two weeks later, the benefit is not appreciable and hence is not recommended. The current choices for prophylaxis are:

- Rifampin for adults and children, oral dose twice a day for two days
- Ciprofloxacin for adults, one time oral dose
- Ceftriaxone for adults and children, one time intramuscular dose.[5]

References

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13. Committee on Infectious Diseases. Prevention and Control of Meningococcal disease: Recommendations for Use of Meningococcal Vaccines in Pediatric Patients. *Pediatrics* 2005;16(2):496-505.

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--West Nile Virus Surveillance 2007--

Between January 1, 2007, and December 31, 2007, a total of 146 cases of West Nile Virus (WNV) were reported to the Maricopa County Department of Public Health (MCDPH). Of these, 68 were confirmed for WNV by lab and case investigation; however, this figure does not include five asymptomatic and unclassified viremic donor cases (TABLE 1, below).

There was a decrease in the total number of WNV cases from 2006, which had a total of 75 cases. The year 2006 also saw more cases of neuroinvasive WNV than WNV fever cases (in 2006, 53% vs. 47% and in 2007, 54% vs. 44%, respectively). Four deaths were confirmed due to WNV in the 2007 season, compared to six deaths in the 2006 season. The MCDPH Office of Epidemiology investigates all suspect cases of WNV. However, the period between March 1, 2007, and November 30, 2007, marks a period of enhanced surveillance. The city of Gilbert, Arizona, continues to observe the highest incidence of WNV cases (TABLES 2 and 4, below). The overall incidence of WNV in the 2007 season in Maricopa County was 1.79 per 100,000 population.

FIGURE 1: West Nile Virus Transmission Cycle Diagram
(Source: MCDPH Presentation on WNV, "Training Slides", 2008)

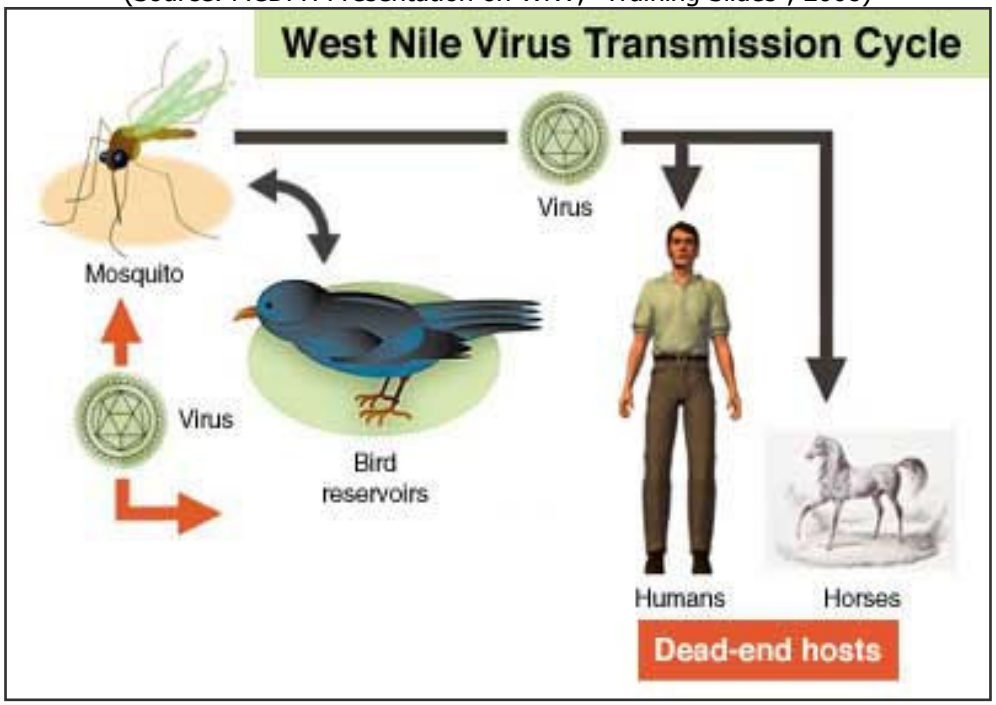


TABLE 1

Arbovirus Season, 2007
Cumulative Data

West Nile Virus Cases by Gender and Disease Classification
Maricopa County, 2007

Case Classification	# Male	# Female	Total # Cases	%*	# Deaths
Encephalitis	14	9	23	34	4
Meningitis	7	5	12	18	
Paralysis Syndrome	0	2	2	3	
Neuroinvasive Disease, Cumulative	21	16	37	54	
Fever	6	20	26	38	
Viremic Donor: Fever	3	1	4	6	
Fever Cumulative	9	21	30	44	
Unknown	1	0	1	1	
Total Cumulative	31	37	68	100	4
Viremic Donor: Asymptomatic	2	2	4		4
Viremic Donor: Unclassified†	1	0	1		1

* Percentages are rounded to the nearest whole number.

† One donor positive was grouped with Viremic Donor Unclassified, WNV detected in serum via NAT (Nucleic Acid Test).

West Nile Virus Deaths by Age

Low	High	Median
51	93	75.5

TABLE 2

West Nile Virus Case Rates in Maricopa County Cities, 2007

City	Cases (N)†	Population*	Rate/100,00**
Gilbert	8	185,030	4.32
Chandler	8	235,450	3.40
Glendale	6	243,540	2.46
Scottsdale	5	237,120	2.11
Mesa	7	451,360	1.55
Phoenix	13	1,505,265	0.86
Total	**19**	**716,110**	**2.65**
Total in Maricopa County	**68**	**3,792,675**	**1.79**

* Population statistics obtained from Arizona Department of Economic Security, July 2006

** Rate per 100,000 population = (N/Population) * 100,000

† Table only includes cities with 5 or more West Nile Virus Cases

TABLE 3

Arbovirus Season, 2006
Cumulative Data

West Nile Virus Cases by Gender and Disease Classification
Maricopa County, 2006

Case Classification	# Male	# Female	Total # Cases	%*	# Deaths
Encephalitis	19	4	23	31	6
Meningitis	8	5	13	17	
Paralysis Syndrome	4	0	4	5	
Neuroinvasive Disease, Cumulative	31	9	40	53	6
Fever	11	17	28	37	
Viremic Donor: Fever	6	1	7	9	
Fever Cumulative	17	18	35	47	
Total Cumulative	**48**	**27**	**75**	**100**	**6**
Viremic Donor: Asymptomatic	1	2	3		1

* Percentages are rounded to the nearest whole number.

West Nile Virus Deaths by Age

Low	High	Median
49	83	71

TABLE 4

West Nile Virus Case Rates in Maricopa County Cities, 2006

City	Cases (N)†	Population*	Rate/100,00**
Gilbert	6	185,030	3.24
Chandler	7	235,450	2.97
Scottsdale	7	237,120	2.95
Mesa	12	451,360	2.66
Glendale	5	243,540	2.05
Phoenix	22	1,505,265	1.46
Total	59	2,857,765	2.06
Total in Maricopa County	**75**	**3,792,675**	**1.98**

* Population statistics obtained from Arizona Department of Economic Security, July 2006

** Rate per 100,000 population = (N/Population) * 100,000

† Table only includes cities with 5 or more West Nile Virus Cases

For more information:

Maricopa County Department of Public Health websites:

Mosquito reduction and avoidance, dead bird reporting:
http://www.maricopa.gov/EnvSvc/VectorControl/WNV/WnvInfo.aspx

Maricopa County website on WNV: http://www.maricopa.gov/wnv/

Educational Materials for Children:
http://www.maricopa.gov/Public_Health/HotTopics/WNV/KidsInfo.aspx

Arizona Department of Health Services website on WNV: www.westnileaz.com
ADHS toll-free number: 1-800-314-9243 provides information about WNV.

CDC: http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

México: http://www.cenave.gob.mx/von/default.asp

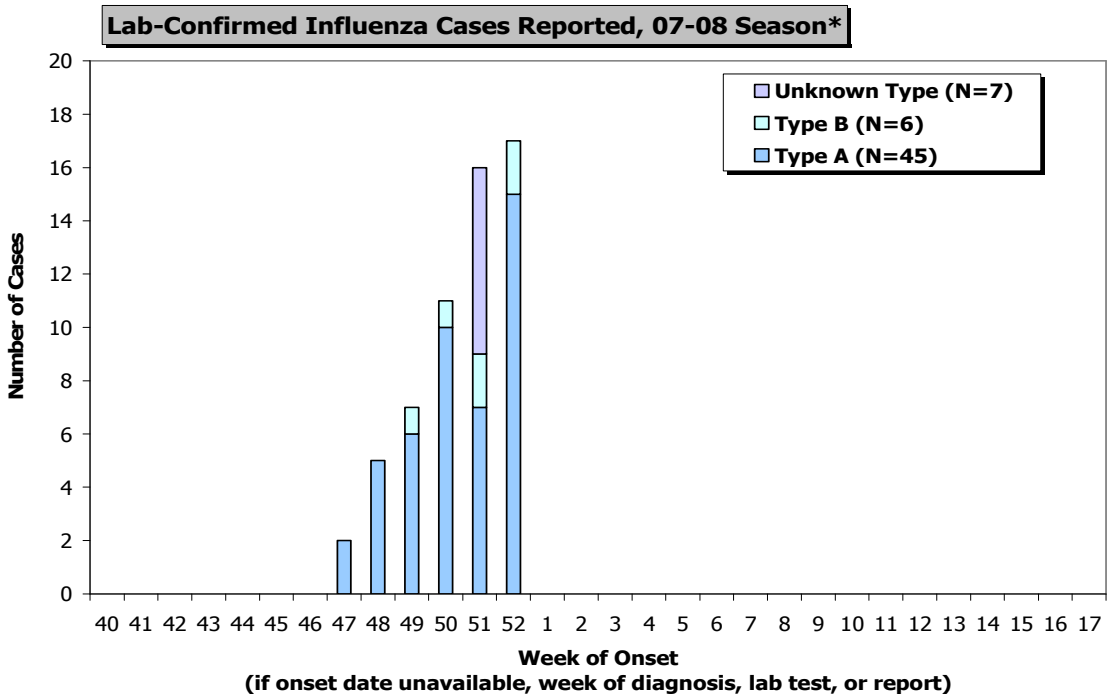
Don't forget animal bites need to be reported! A bite from *any* animal, whether it is vaccinated, stray, or wild is required by law to be reported.

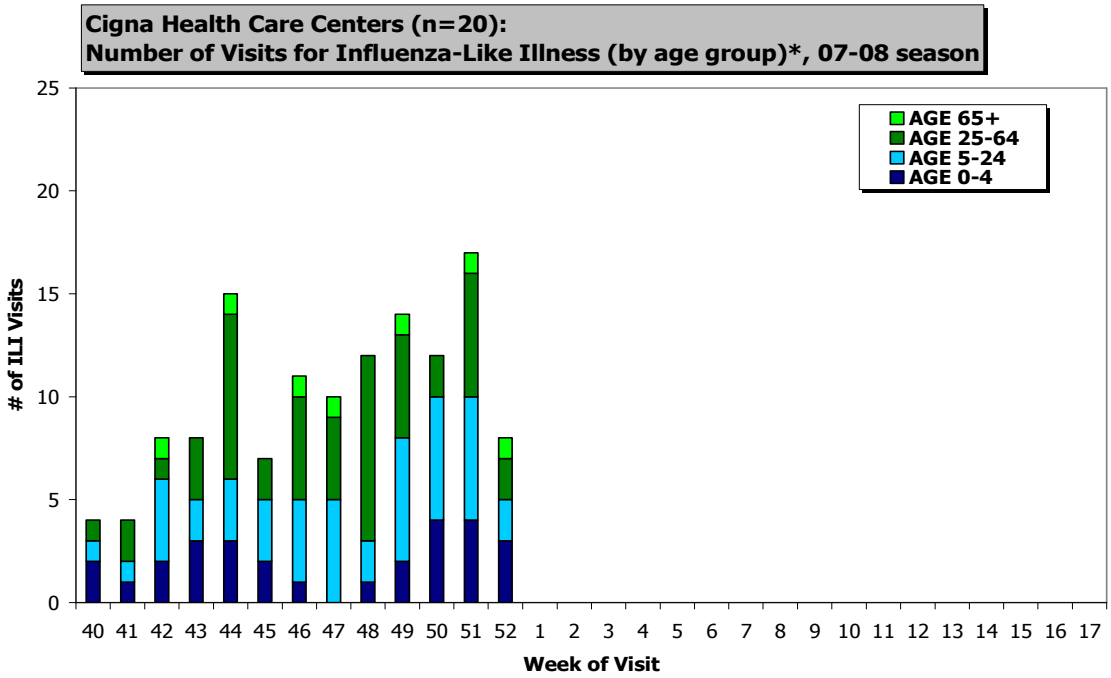
* Arizona Revised Statutes- Title 11, Article 6, 11-1014 section D.

SURVEILLANCE

During the 2007-2008 influenza season, MCDPH continues to work with local hospitals, urgent care centers, and health care centers to monitor weekly levels of influenza-like illness. Additionally, MCDPH has been collecting weekly absenteeism information from local participating schools. The following is a weekly summary of lab confirmed and ILI reports from week 40 (starting 9/30/07) through week 20 (starting 5/12/08). (http://www.maricopa.gov/Public_Health/epi/flu.aspx)

MCDPH greatly appreciates the efforts of our community surveillance partners. If you are interested in participating in the seasonal Influenza Surveillance Program, or if you have questions regarding reporting, please call or email Derek Steinke: (602) 372-2622 DerekSteinke@mail.maricopa.gov.


Lab-Confirmed Influenza Cases Reported, 07-08 Season*
Unknown Type (N=7)
Type B (N=6)
Type A (N=45)
Number of Cases
0 2 4 6 8 10 12 14 16 18 20
40 41 42 43 44 45 46 47 48 49 50 51 52 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Week of Onset
(if onset date unavailable, week of diagnosis, lab test, or report)


Cigna Health Care Centers (n=20):
Number of Visits for Influenza-Like Illness (by age group)*, 07-08 season
AGE 65+
AGE 25-64
AGE 5-24
AGE 0-4
# of ILI Visits
0 5 10 15 20 25
40 41 42 43 44 45 46 47 48 49 50 51 52 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Week of Visit

Maricopa County Communicable Disease Summary Confirmed and Probable Cases Reported in 2007					
DIAGNOSIS	**FIRST QUARTER**	**SECOND QUARTER**	**THIRD QUARTER**	**FOURTH QUARTER**	**TOTAL**
Amebiasis	2	2	1	2	**7**
Aseptic Meningitis (Viral)	91	117	185	128	**521**
Brucellosis	4	0	1	0	**5**
Campylobacteriosis	100	246	147	86	**579**
Cholera	0	1	3	0	**4**
Clostridium Difficile	0	0	0	2	**2**
Coccidioidomycosis	376	113	6	6	**501**
Creutzfeldt-Jakob Disease	3	0	0	0	**3**
Cryptococcosis	0	1	1	1	**3**
Cryptosporidiosis	4	3	12	7	**26**
Dengue	0	0	4	2	**6**
Diarrhea, Nausea, Or Vomiting	5	0	0	0	**5**
E. Coli	6	8	11	18	**43**
E. Coli O157:H7	3	8	13	3	**27**
Encephalitis: NOS	0	0	0	1	**1**
Encephalitis: Viral	1	2	4	4	**11**
Giardiasis	16	19	28	14	**77**
H. Flu Invasive Disease	19	12	5	12	**48**
Hemolytic Uremic Syndrome (Hus)	1	2	1	1	**5**
Hepatitis A	14	24	23	16	**77**
Hepatitis B	227	220	310	232	**989**
Hepatitis C	395	416	375	275	**1461**
Hepatitis D	2	0	1	0	**3**
Hepatitis E	0	0	1	0	**1**
Influenza	55	9	6	22	**92**
Kawasaki Syndrome	4	9	1	3	**17**
Legionellosis	3	2	16	10	**31**
Listeriosis	1	1	3	2	**7**
Lyme Disease	0	0	4	0	**4**
Malaria	3	1	4	0	**8**
Meningitis: Bacterial Other	5	1	2	3	**11**
Meningococcal Invasive Disease	2	3	0	0	**5**
Mumps	4	2	2	1	**9**
Non-Reportable Disease	7	3	5	4	**19**
Pertussis	67	33	29	12	**141**
Q Fever	0	0	1	0	**1**
Rabies Exposure	3	1	1	0	**5**
Rash	0	2	2	0	**4**
Respiratory Syncytial Virus (RSV)	7	2	0	15	**24**
Rocky Mountain Spotted Fever	2	3	0	0	**5**
Salmonellosis	70	103	181	137	**491**
Scabies	1	1	4	1	**7**
Schistosomiasis	0	0	1	0	**1**
Shigellosis	42	49	139	79	**309**
Staphylococcal Infection	230	234	200	175	**839**
Streptococcal Group A Infection	39	29	27	27	**122**
(Continued)					

DIAGNOSIS	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	TOTAL
Streptococcal Group B Infection	19	18	9	8	**54**
Streptococcal Infection Other	1	1	1	0	**3**
Streptococcus Pneumoniae Infection	223	120	48	131	**522**
Taeniasis	2	0	0	0	**2**
Toxic Shock Syndrome	0	0	3	1	**4**
Typhoid Fever	1	1	2	1	**5**
Unexplained Death With Fever	0	0	1	0	**1**
VRE (Vanc Res Enterococcus)	502	433	317	353	**1605**
Varicella	301	147	63	94	**605**
Vibrio Infection	1	0	2	2	**5**
West Nile Virus	0	15	52	6	**73**
Yersiniosis	0	0	0	2	**2**
All	**2864**	**2417**	**2258**	**1899**	**9438**

Note: This table includes *confirmed* and *probable* cases listed by CDR date, which is equivalent to the date of onset or next available date if onset date is unknown. This date may differ from ADHS data which is selected by date of report to the State.

For a complete list of reporting requirements for communicable diseases:
http://www.maricopa.gov/Public_Health/ControlPrevention/Communicable/default.aspx

MCDPH Division of Epidemiology/PHEM

Contact List (all in 602 area code)

Abrium Escarzaga	Senior Epidemiologist	372-2643
Alana Shacter	Epidemiologist	372-2636
Bob England	Medical Director, MCDPH	506-6601
Cheryl Phillips	Administrative Assistant	372-2605
Derek Steinke	EPI Office Specialized	372-2622
Gary West	Statistical Programmer	372-2603
Jennifer Stewart	Epidemiologist	372-2621
Liva Nohre	Senior Epidemiologist	372-2631
Mare Schumacher	Deputy Director, Epidemiology	372-2602
Purvi Patel	Epidemiologist	372-2613
Philip Zuckerman	Surveillance Data Analyst	372-2606
Réchelle Harrion Moore	Communicable Disease Investigator	372-2618
Sarah Santana	Director, Epidemiology	372-2601
Lori Zuptich	Data Specialist	372-2614
Tammy Sylvester	Surveillance Nurse Supervisor	372-2617
Andrew Missel	Data Analyst – Infectious Disease	372-2665
Vjollca Berisha	Senior Epidemiologist	372-2611
Amy Prestanski	Epidemiologist	372-2625

To report communicable diseases, unusual health occurrences, and public health emergencies (all 602 area codes)

	Business Hours M-F 8a—5 p	**After 5p**
Animal bite reports	506-7387	506-7387
Communicable diseases	506-6767	747-7111
Death certificates	506-6805	450-9982 (pager)
Funeral homes, human remains (pager)		229-9315
HIV (reports)	506-6426	Next business day
Public health emergencies	747-7111	747-7111
Rabies	747-7111	747-7111
STDs (other than HIV)	506-1687	Next business day
TB	506-5065 or 372-1408	747-7111
WNV Hotline	506-0700	506-0700